

PATENT SPECIFICATION

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DRAWINGS ATTACHED

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(72) Inventor WILLIAM FRANK JUDD



(54) IMPROVEMENTS IN AND RELATING TO VESSEL CLOSURES

(71) We, WHESOE LIMITED, a British Company, of Darlington, Co. Durham, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to an improvement in the closure described and claimed in British Patent Specification No. 1175875.

There is claimed in claim 1 of the above mentioned application a closure for a vessel comprising an aperture defining portion, a closure element angularly movable about the axis of first hinge means relative to said portion between an open condition and a closed condition engaging a seating to seal the aperture and a locking lever angularly movable about the axis of second hinge means relative to said portion between an open condition free of the closure element and a closed condition lying over and engaging the closure element in its closed condition, the axes of the hinge means being substantially parallel and each hinge means being coupled to said portion by retaining means which in the closed condition of the closure element and locking lever bias the said hinge means toward said portion.

According to the present invention there is provided a closure for a vessel comprising an aperture defining portion, a closure element angularly movable about first hinge means relative to said aperture defining portion between an open condition and a closed condition in which the closure element engages a seating to seal the aperture, a first locking lever angularly movable about a second hinge means relative to said aperture defining portion between an open condition free of the closure element and a closed condition in which the first locking lever lies over and bears on the closure element and a second locking lever angularly movable about the first hinge means between an open condition free of the closure element and first locking

lever and a closed condition in which the second locking lever lies over the closure element and first locking lever and bears on the first locking lever, the axes of the hinge means being parallel and the hinge means being coupled to said aperture defining portion by retaining means which in the closed condition of the closure element and locking levers bias said hinge means towards said aperture defining portion.

An embodiment of the present invention will now be described by way of example only with reference to the accompanying drawings of which:

Figure 1 is a plan view of the closure with the locking levers in closed condition;

Figure 2 is a section on the line A—A of Figure 1;

Figure 3 is a section on the line B—B of Figure 1; and

Figure 4 is a section on the line C—C of Figure 1.

Referring to the drawings the closure comprises a base plate 1 adapted to be secured to a neck ring surrounding a suitable opening in a tank, the base plate being formed with an opening surrounded by an upstanding flange 2. A closure cap 3 carries a gasket with hinge lugs 5 which each pivotally engage a portion 6' of a hinge pin 6 intermediate its ends. Each hinge pin 6 is mounted by eccentric extensions 7, 7' in apertures formed in the end portions of bolts 8. The bolts extend downwardly through the base plate 1, each bolt being surrounded below the base plate by disc spring washers 9, for example Belleville washers or washers sold under the Trade Name "Anderton 999", which urge the bolts downwardly.

A locking lever 10 is mounted on and keyed to the eccentric extensions 7 of hinge pins 6.

A further locking lever 11 is mounted on and keyed to the central portions 12 of two coaxial hinge pins 13 disposed on the side of the cap opposite to the hinge pins 6. The hinge pins 13 are each mounted by

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eccentric coaxial extensions 14 of the pins 13 in apertures formed in the end portions of bolts 15 which extend downwardly through the base plate and are each surrounded below the base plate by disc spring washers 16, as for the bolts 8. In a modification the lever 11 is simply rotatably mounted on portions of hinge pins 13 coaxial with portions 14. The eccentric relationship between portions 12, 14 of pins 13 produces a slightly improved leverage. The lever 11 is provided with two bolts 17 adjustably screwed through the lever 11 and locked in position, which bolts project from the underside of the lever adjacent the connection of the lever to the pins 13. The purpose of these bolts is described hereafter.

In operation, after the cap 3 has been rotated to its closed position about portions 6' of hinge pins 6, the lever 11 is rotated towards its closed position about the common axis of extensions 14 of hinge pins 13. As the lever approaches a near horizontal position the lower end of the bolts 17 engage the upper surface, adjacent the free end, of the cap. Continued rotation of the lever then causes the lever to pivot about the ends of bolts 17 causing the pivot pins 13 and bolts 15 to rise against the force of the springs 16, to compress the springs 16 and thereby urge the cap against its seating.

After the lever 11 has been rotated to its closed near horizontal position, the lever 10 is rotated towards its closed position. The axes of portions 6', 7 and 7' of hinge pins 6 are so positioned that as the lever 10 is rotated to its closed position the axis of portions 7, 7' is rotated relative to that of portion 6' from a position below that of portion 6' to a position above that of portion 6' thereby causing the bolts 8 to rise and the springs 9 to be compressed. The mechanical advantage of this lever 10 is very large because the spacing of the axes of portions 6' and 7, 7' is very much smaller than the distance between the axis of portion 6 and the free end of the lever to which the operator applies force. The mechanical advantage may for example be of the order of 80.

The optimum relative position of these two axes when the lever 10 and cap are closed has been found to be such that the line joining and perpendicular to the two axes is angularly displaced from the plane of the aperture by an angle of substantially 45° in the direction of movement of the lever 10 and cap to lever closed position. With such relative positioning of the axes the lateral movement of the portion 6' of the pin 6 and the cap 3 relative to the flange 2 during closing of the lever 10 is kept to a minimum. This angle may, however, be between 0° and 90°.

At an intermediate position of the lever

10, the underside of the lever contacts the free end of lever 11 which, as previously stated, is in a near horizontal position, continued rotation of the lever 10 thus forcing the lever 11 to its closed position with consequent compression of spring 16.

The cap is thus firmly held against its seating by the force of the compressed springs 9, 16.

The free end of the lever 10 is formed with arms 18 each of which is provided with a transverse aperture to receive a latch 19 which is also passed through an aperture 20 in a lug 21 provided on cap 3 to lock to the closure in its closed position. The ends of arm 18 are united by a pad 22 provided with a roughened surface on which the operator steps to close the lever 10.

Suitable venting arrangements may be provided in this closure as are provided in the closure of the above mentioned Patent Specification No. 1175875.

The filler openings of rail tankers are generally of the order of 18" in diameter and the closures for the openings must withstand an internal pressure of at least 25 p.s.i. without lifting from their seatings. This latter requirement means that the biasing force of the springs holding the cap on its seating must be sufficient to withstand such a pressure. The biasing force for example of the order of 6360 lbs is of such magnitude that one man using direct leverage would be unable to produce the required compression of the springs in locking the closure. With the above described closure the force required from the operator may, for example, be of the order of only 70 lbs. which is well within the ability of a single man.

The above described closure is particularly suitable for use with rail tankers because the eccentric mounting of the second or final locking levers, producing compound lever systems, effectively reduces the force required to compress the springs to a desirable level.

WHAT WE CLAIM IS:—

1. A closure for a vessel comprising an aperture defining portion, a closure element angularly movable about first hinge means relative to said aperture defining portion between an open condition and a closed condition in which the closure element engages a seating to seal the aperture, a first locking lever angularly movable about a second hinge means relative to said aperture defining portion between an open condition free of the closure element and a closed condition in which the first locking lever lies over and bears on the closure element and a second locking lever angularly movable about the first hinge means between an open condition free of the closure element and first locking lever and a closed condition in which the second locking lever lies over the closure ele-

ment and first locking lever and bears on the first locking lever, the axes of the hinge means being parallel and the hinge means being coupled to said aperture defining portion by retaining means which in the closed condition of the closure element and locking levers bias said hinge means towards said aperture defining portion.

2. A closure as claimed in claim 1 wherein each hinge means comprises a pin and said retaining means comprise bolts through which the pins extend and which extend through a base plate for mounting on the vessel and are biased by springs towards the base plate.

3. A closure as claimed in either claim 1 or claim 2 wherein said first hinge means comprises a first portion having a first axis about which the closure element is angularly movable and a second portion having a second parallel axis spaced from the said first axis to which the second locking lever is connected, the second portion of the first hinge means being coupled by said retaining means to said aperture defining portion.

4. A closure as claimed in claim 3 wherein the first and second axes of the first hinge means are relatively positioned such that in the closed condition of the closure element and second locking lever a line perpendicular to and passing through said axes is angularly displaced from the plane of the aperture by an angle between 0° and 90° in the direction

of movement of the closure element and second locking lever to the closed condition.

5. A closure as claimed in claim 4 wherein said angle is substantially 45° .

6. A closure as claimed in any of the preceding claims wherein the first locking lever bears on the closure element through a projection on the undersurface of the lever which contacts the upper surface of the closure element during movement of the first locking lever from its open to its closed condition.

7. A closure as claimed in any of the preceding claims wherein the second locking lever bears on a margin portion of the first lever, opposite its connection with the second hinge means during movement of the second locking lever from its open to its closed condition.

8. A closure as claimed in any preceding claim comprising a lug on the first locking lever which, in the closed condition of the first and second locking levers extends through the second locking lever and means for releasably securing the lug to the second locking lever.

9. A closure substantially as herein described with reference to the accompanying drawings.

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COMPLETE SPECIFICATION

2 SHEETS

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Sheet 1

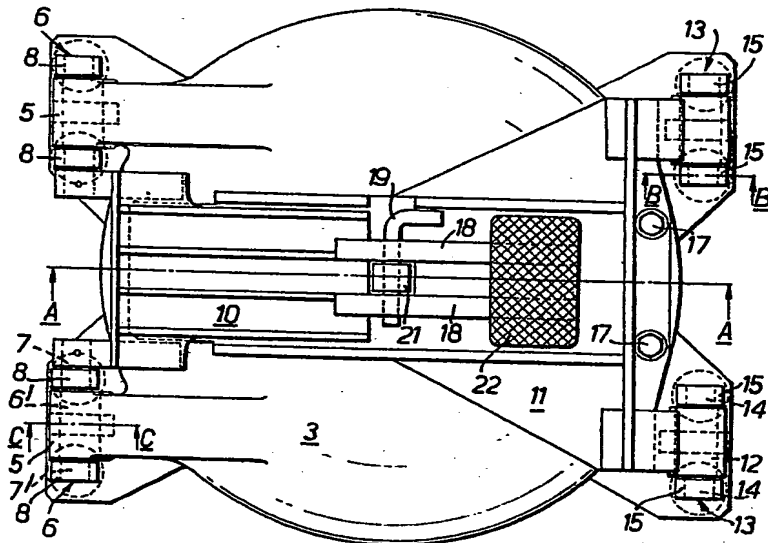


FIG. 1.

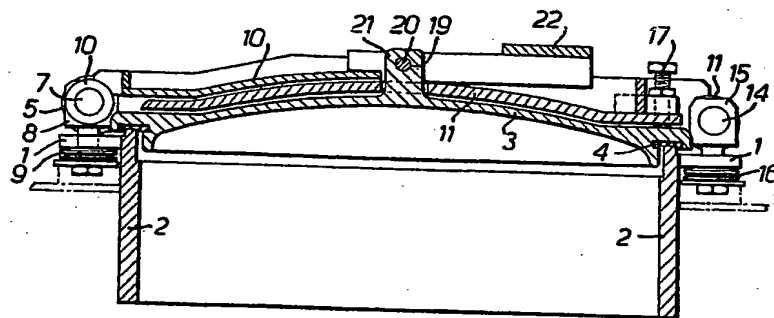


FIG. 2.

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COMPLETE SPECIFICATION

2 SHEETS

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Sheet 2

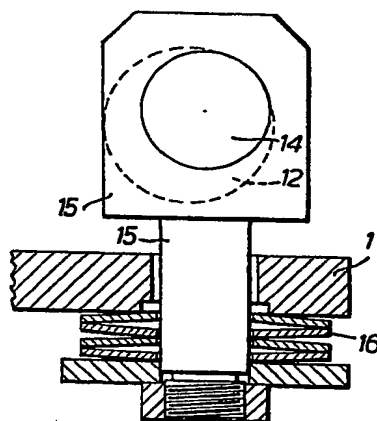


FIG. 3.

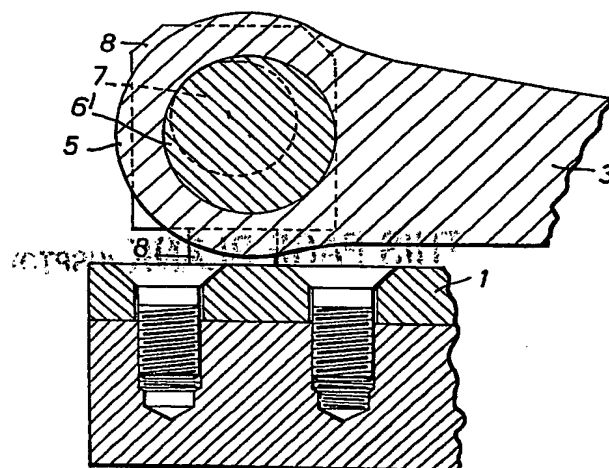


FIG. 4.

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